disease. Using the Kaplan-Meier method, the estimated 5-year contralateral recurrence-free survival (CRFS) was 90.7% for the total population and 81.3% for the N2b subgroup (*p=0.038*). There was no statistical difference in overall survival (OS) between the N0-2a and N2b subgroups (91.5% *vs* 86.9%, *p=0.654*).

Conclusion: In view of the high risk of a contralateral neck recurrence, bilateral neck radiotherapy should be considered for well-lateralized, T0-T2, HPV-related squamous cell carcinomas of the tonsil presenting with N2b disease.

EP-1033

Pattern of radiation induced thyroid changes in NPC patients in first 3 years post-chemoradiotherapy

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Purpose or Objective: Thyroid gland is often irradiated in radiotherapy (RT) of nasopharyngeal cancer (NPC) patients leading to radiation induced thyroid disorder. This study aimed to evaluate the pattern of thyroid gland changes in the first 3 years after the completion of chemoradiotherapy.

Material and Methods: Adult NPC patients treated by concurrent chemo-RT (Cisplatin and 5 Fluorouracil) between 2007 and 2011 were recruited. A 7-beam intensity modulated radiotherapy (IMRT) plan was delivered using 6 MV photons. 70 and 66 Gy were prescribed to the PTVs of the nasopharynx and neck lymphatics respectively. Mean thyroid dose was obtained from dose volume histogram using the treatment planning system. Before RT, apart from planning CT, baseline thyroid hormone levels of each patient, comprising free T3 (fT3), free T4 (fT4) and TSH were established by extracting 6 ml of blood. Repeated measurements of the fT3, fT4, TSH and CT were taken at 3, 6, 12, 18, 24, 30 and 36 months after completion of RT. Readings of the 3 hormone levels and thyroid volume obtained from CT at each time interval were recorded. Trend lines of each parameter were plotted. The incidence of hypothyroidism was recorded based on the hormonal findings. The association between the mean thyroid dose and hypothyroidism was evaluated.

Results: 21 patients (M = 13, F = 8) completed the 3-year follow up. The mean thyroid dose ranged from 18.3-61.5 Gy (average 42.8±9.6 Gy). The average volume of the thyroid gland decreased from 17.6 cm3 at pre-RT to 12.3 cm3 at 18 months and remained stable afterward. The average level of fT4 decreased rapidly in the first 6 months, then slowed down and remained stable after 24 months (Fig 1). The average TSH level showed a significant rise between 6 to 18 months and became steady afterward. The level of fT3 remained constant throughout the study period. The incidence of hypothyroidism increased from 7.8% at 3 months to 34.4% at 18 months and remained relatively steady thereafter. Significant association was found between mean thyroid dose and incidence of hypothyroidism.

Conclusion: Our study demonstrated that 18-24 months after chemoradiotherapy was a critical time interval where 1) shrinkage of thyroid gland was stabilized; 2) decrease of fT4 and increase of TSH levels became steady; 3) incidence of hypothyroidism started to rise. All the parameters reached a relatively steady state after 36 months. Applying dose constraints to the thyroid gland in RT treatment planning was recommended to reduce the risk of hypothyroidism.

EP-1034

Cachexia induces head and neck changes in locally advanced oropharyngeal carcinoma

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Purpose or Objective: Cancer cachexia is a paraneoplastic syndrome characterized by weight loss (WL) and sarcopenia. Aim of the study was to assess the impact of cachexia on head and neck changes during definitive cisplatin- image-guided volumetric modulated arc radiation therapy (VMAT) in a series of locally advanced oropharyngeal cancer.

Material and Methods: Volume variations of sternocleidomastoid muscle (SCM) were considered as surrogate of muscle changes related to sarcopenia. For the purpose of the study , two head and neck diameters, encompassing the cranial limits of II and III neck nodal levels (here defined as "head-diameter" and "neck-diameter", respectively), were measured. All parameters analyzed were defined retrospectively by means of on-board cone beam computed tomography (kV-CBCT) images at 1th , 8th, 15th, 22th radiotherapy fraction (fx) and at the end of treatment. Cachexia was defined as WL > 5% during treatment. Statistical analysis was conducted correlating the parameters changes with three WL ranges: < 5%, 5-9% and > 10%.

Results: 30 patients, underwent to definitive cisplatin-VMAT, were retrospectively evaluated . A total of 150 contoured SCMs and 300 diameters were collected. Median WL of patients during treatment was 6.5% (range, 0-16%). The most significant SCM shrinkage was recorded at 15th fx (mean reduction of 1.6 cc), in correlation with WL 5-9% and WL > 10% (p 0.001). For "head-diameter" the peak reduction was recorded at the 15th fx (mean reduction of 8 mm), statistically correlated to WL > 10% (p 0.001). The peak reduction of "neck-diameter" was registered at the 22th fx (mean value of 6 mm). "Neck-diameter" gradually reduced until the end of treatment for WL > 5%.

Conclusion: The head and neck volume changes here analyzed showed to be potentially related to cancer cachexia. Present data could provide relevant adaptive radiation therapy implications for further investigations.

EP-1035

Predictors of mucositis in volumetric modulated radiotherapy for oropharyngeal-oral cavity cancer

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Purpose or Objective: to assess predictors of mucositis in oropharyngeal and oral cavity cancer after definitive or adjuvant volumetric modulated arc radiotherapy (VMAT) +/- chemotherapy.

Material and Methods: For the purpose of this retrospective analysis, inclusion criteria were: age ≥ 18 years, histologically proven carcinoma of the oropharynx and oral cavity, no dysphagia at baseline, radical and adjuvant treatment with VMAT (RapidArc®, Varian Medical System, Palo Alto, CA, USA). Fifty patients were evaluated. Statistical Analysis was performed for the following parameters as potential predictors of mucositis ≥ G2: total oral mucosa (OM) and OM minus target high-low radiation dose regions (PTVs), mean dose (Dmean) and maximum dose (Dmax), chemotherapy, weight loss, dysphagia.

Results: mucositis ≥ G2 was related to total OM Dmean ≥ 50 Gy (p .02, CI 95%: 0.1-1.3) and Dmax ≥ 65Gy (p .04, CI 95%: 0.1-1.3). At logistic regression, for Dmean ≥ 50 Gy and Dmax ≥ 65 Gy, the risk of mucositis ≥ G2 increased around 4 times (p .04). Considering OM minus target PTVs, the following volumetric constraints were related to mucositis ≥ G2: V45Gy > 40 % (p .04, CI 95%: 0.9-2.3), V50Gy > 30 % (p .009, CI 95%: 0.6-1.4), V55 Gy > 20 % (p.003, CI 95%: 0.5-1.2). At logistic regression, for OM minus target PTVs V45 > 40, V50 > 30 and V55 > 20 the risk of mucositis≥ G2 increased around 5 times (p .05). A ratio between total OM and OM minus target PTVs > 2.5 is related to G3 mucositis (p .03, CI 95%: 0.8-1.8).

Conclusion: new parameters were found as predictors of moderate-severe mucositis.

EP-1036

Glottic carcinoma stage T1 radiotherapy

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Purpose or Objective: Retrospective review of results of radiotherapy for stage T1 glottic carcinoma.

Material and Methods: A retrospective review was done of all patients with squamous cell carcinoma of the glottis stage T1 treated with radiotherapy between 1960 and 2012 inclusive. There were 995 patients identified. All patients were treated with wedged lateral or angled anterior oblique technique. The main site of relapse was local and hence the main end point for anaysis was local control at 5 years. Survival curves were calculated using Kaplan Meier method and log rank test used to comparer differences.

Results: Overall the 5 year freedom from relapse was 88%. The only factor which influenced outcome was time period of radiotherapy with those between 1960 and 1980 had a 84% relapse free rate, significantly worse than the latter time period. Other factors examined included sex, age, substage T1a and T1b, grade, radiation dose, radiation field size and duration of radiation, and none of those factors had a significant effect on outcome. There were 121 relapses, most in the primary alone and most within the first two years.

Conclusion: The overall 5 year freedom from relapse was 88%.

EP-1037

Dysphagia and irradiation of constrictor pharyngeal muscles: a clinical-dosimetric correlation

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Purpose or Objective: To correlate clinical late dysphagia with the dose received by the constrictor pharyngeal muscles in patients receiving induction chemotherapy (ICT) and radiochemotherapy (RT-CT) with SIB-VMAT technique.

Material and Methods: Between July 2010 and January 2015, 51 patients with locally advanced head and neck cancer underwent ICT and subsequent RT-CT with concurrent weekly Cisplatin. The superior, middle, and inferior (S, M, and I) pharyngeal constrictors muscles (CM) were delineated and the correlation between dosimetric parameters and late pharyngeal toxicity was analyzed.

Results: 51 patients [M/F: 41/10, median age 56, range 30-77, stage III: 10 (20%), stage IV: 41 (80 %)] were included in this analysis. The tumor site was: oropharynx in 21 (40%) patients, epipharynx in 10 (20%), oral cavity in 9 (18%), larynx in 5 (10%), and hypopharynx in 6 (12%). ICT in the majority of cases (74%), was based on Cisplatin - 5 -Fluorouracil, with the addition of Docetaxel in 26% of cases. The dose delivered to the primary tumor was 67.5 Gy (in 8 patients, 16 %) and 70.5 Gy (in 43 patients, 84 %); 60 Gy and 55.5 Gy were delivered on high and low risk lymph node levels, in 30 fractions with SIB-VMAT (2 arcs) technique, respectively. With a median follow-up of 11 months (range 3-44), late G1 dysphagia was recorded in 6 patients (12%) and late G2 dysphagia was observed in 2 patients (4%) (CTC-AE v. 4.3). Other late toxicities are reported in the Table 1. G3-4 toxicities were not recorded. In DVH analysis, the median dose received by CM was 66.2 Gy (S: 67.4 Gy, M and I: 67.2 Gy), with V50 being 96.9 % (S: 97.4%, M: 98.3%, and I: 95.9 %), and V60 being 82.4% (S: 86.8%, M: 90.1 %, and I: 73.8%). The median dose received by the larynx was 63.5 Gy (V50: 94.1 %, and V60: 66.2 %). No statistically significant difference between the group of patients with and without late dysphagia was observed.

Table 1: Late toxicity (CTC - AE v. 4.3)

	G0	G1	G2	G3	G4
Hyperpigmentation (%)	0 (0)	9 (18)	1 (2)	0 (0)	0 (0)
Xerostomia (%)	0 (0)	16 (31)	5 (10)	0 (0)	0 (0)
Subcutaneous fibrosis (%)	0 (0)	8 (16)	1 (2)	0 (0)	0 (0)

Conclusion: No statistically significant correlation between dose delivered to the constrictors muscles and late dysphagia was observed in this patients cohort. This result may depend on tolerability of the treatment and then by the small number of recorded adverse events.

EP-1038

IMRT/VMAT-SIB technique chemoradiation in locally advanced head and neck cancer: toxicity results

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Purpose or Objective: To evaluate the toxicity of intensity modulated radio-chemotherapy with simultaneous integrated boost technique (SIB) after induction chemotherapy in patients with locally advanced head and neck (H&N) cancer.

Material and Methods: The IRMA studies are described in the table. Patients with stage III-IV H&N cancer, without progressive disease after induction chemotherapy (IC), underwent radio-chemotherapy with weekly Cisplatin 30